Report from diagnostics group

Nido Landen presentation: 6 x-ray diagnostic techniques for WDM

High energy flash x-ray radiography
- **K-alpha**
- **Bremsstrahlung**

EXAFS (extended x-ray absorption fine structure) measure photon energy spectrum to measure temperature (0.1 to 1 eV)

Diffraction (0.1 – 1 eV) measures dynamic response of crystal lattice

Coherent scattering - 2.4 eV ion structure

X-ray Thomson scattering (1-100 eV)

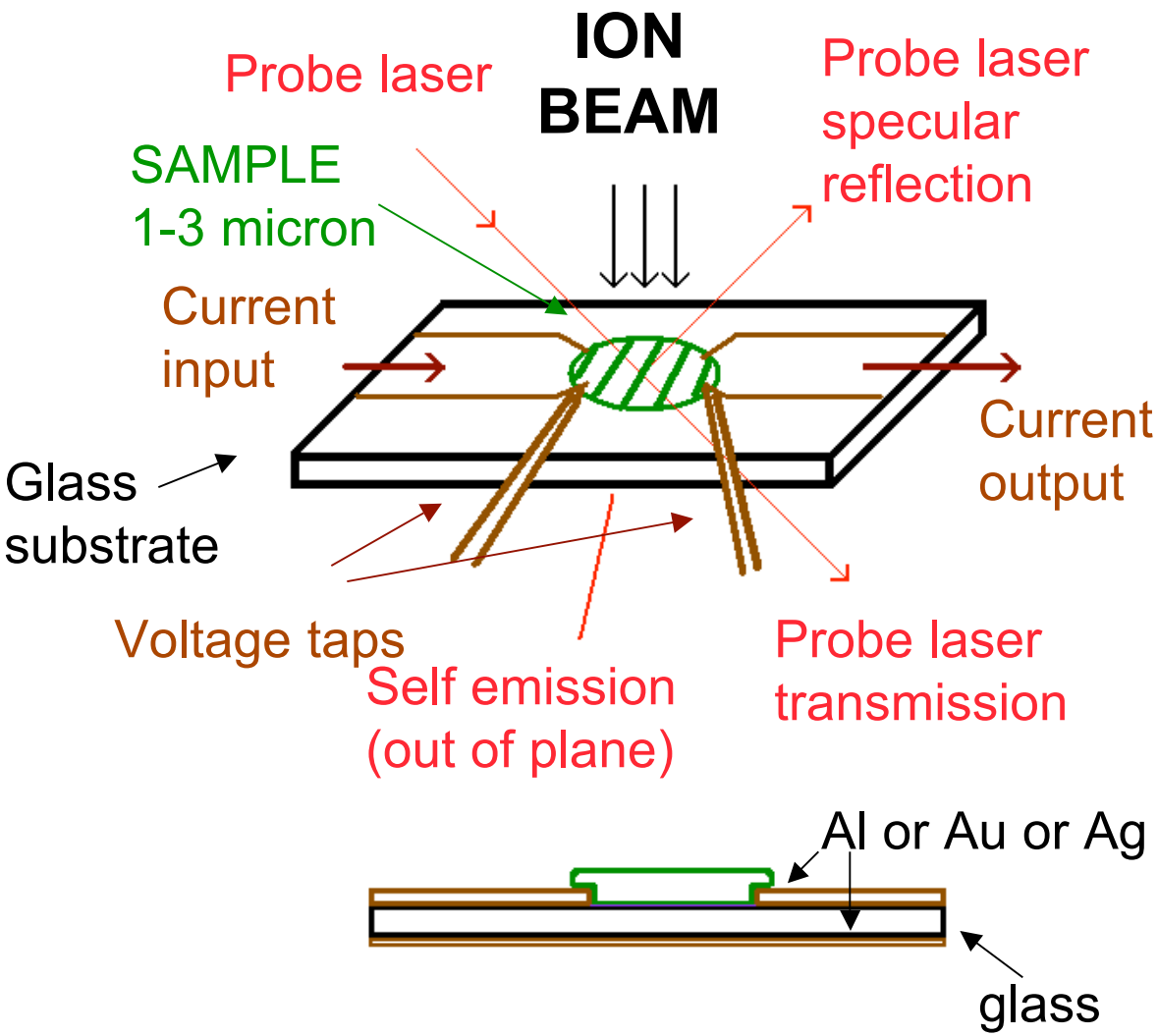
Collisionally broadened plasma resonance (1-300 eV)

Discussion on diagnostics

- 4- ways to measure temperature (R. More)
  - Hydrodynamic release: x-rays, lasers, optical imaging
  - Electrical conductivity: need to worry about charged particles, contact potential. ➔Sandwich, perhaps Terahertz waves
  - Optical emission: optical laser probe/polarimetry; pyrometer has problem with thin optical skin depth ~ 100 Angstrom
  - X-ray diffraction (previous slide)
- dE/dx: Na/Li source; two-beam – measure energy of Li or H+ beam beyond target, ion beam radiography
- X-pinch used as an x-ray source (D. Hammer; U Nevada Reno)
- Measure pressure using shock waves: pulsed pump & cw probe lasers
- Beam spot: GSI – K-alpha; NDCX, HCX – gas cloud or scintillator

Conceptual design of a generic WDM target for reproducible manufacture (original sketch R. More).

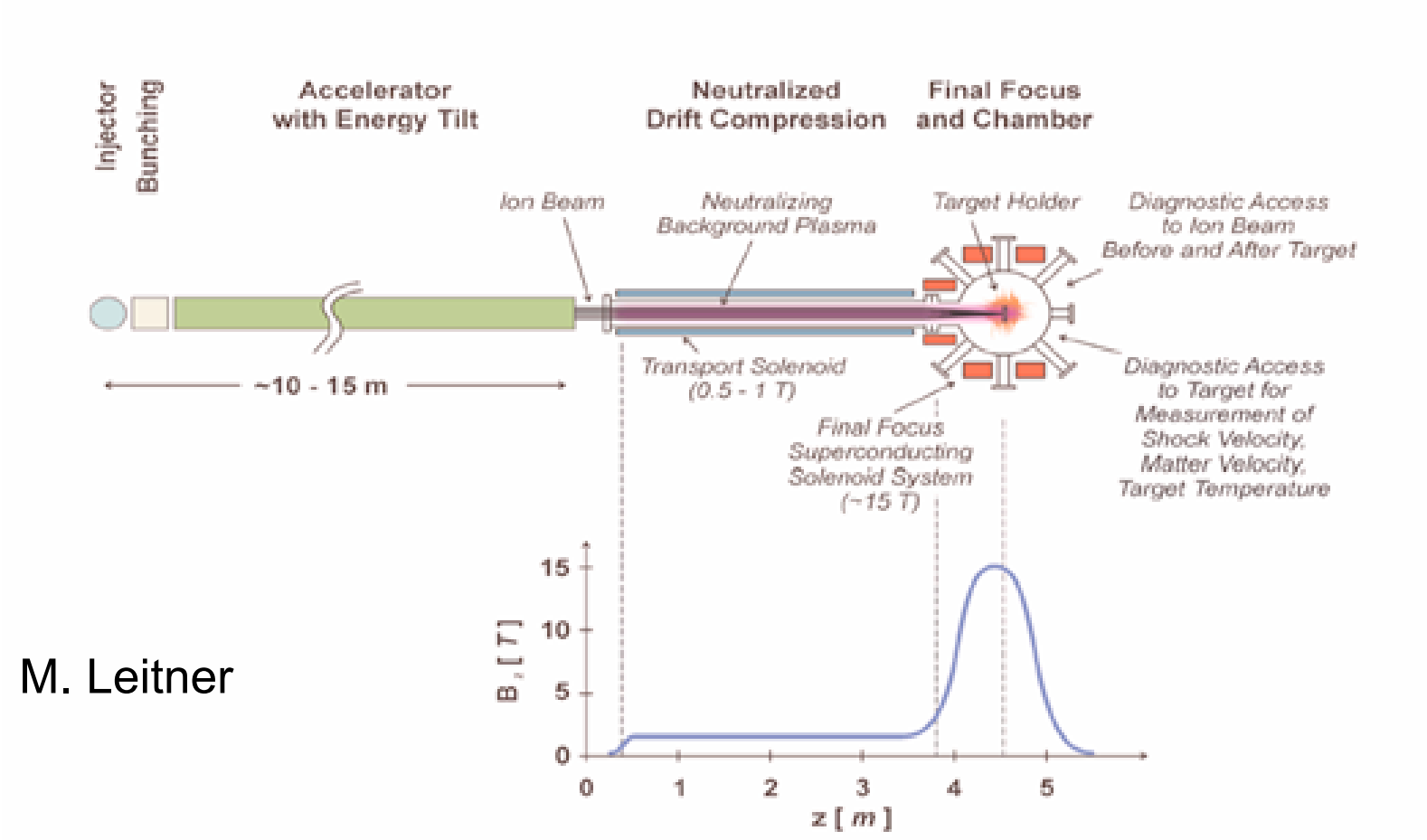
- **Target to be mounted on a remote positioner/ carousel target changer.**
- **Simple optical/electrical diagnostics as indicated**
- **Attention to**
  - **Dimension and position**
  - **Inductance**
  - **Optical transmission**



Target chamber

- Larry Grisham: What is effect of 5-15 T solenoid magnetic field on target and diagnostics?
- Need to model solenoid with access holes for multiple target chamber ports: on axis, 90 degrees, and 45 degrees upstream and downstream.
- Target manufacturing cost?
- H. Yoneda:
  - Diagnostic mirror in center of annular beam
  - Suggests possibility of including part of this work in US-Japan collaboration.

Target chamber – require multiple ports in presence of strong solenoid final focus.



M. Leitner

Schematic drawing of a solenoid final focus system for HEDP studies on NDCX-II.

Initial diagnostic suite roughly prioritized

- Streak camera (purchase)
- Fast optical pyrometer (GSI?)
- VISAR (purchase)
- X-ray source (x-pinch?) as backlighter
- X-ray pinhole camera
- Optical spectrometer
- UV spectrometer
- X-ray spectrometer
- Short pulse pump laser